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# Simple Way for a Successful Path

**Introduction**

Education is the basic path to create a complete person improving high thinking and analytical skills for solving problems. Certain defects of the science education would be observed in developing countries minimizing the nations' strength towards the better development. Quality of the science education is the common fact to be considered in developing countries. Most of the developing countries are following western educational systems which are unsuitable for man's strength in developing countries as a result of the colonization. Exam oriented teaching processes are going on without understanding and applications. Learner centered, activity based science education is unpracticed due to the compact, advanced theories and concepts. Lack of skillful science teachers, unavailability of proper teacher training programs and lack of resources are major problems in those countries. How to prepare an active based lesson to enhance learners' knowledge and skills was focused overcoming 'teacher centered' teaching process. The lesson 'battery chemistry' was formulated considering above facts and applied in some Sri Lankan high schools.

Learner centered science lesson

What is a learner centered science lesson? A lesson for learners' evolvement is simply defined a learner centered lesson. 'Inquiry science learning' enhances learners' 'finding ability and 'problems solving ability' improving different skills and knowledge. Activity based or experimental based science lessons act towards the inquiry science lesson. Explanation of concepts and theories according to the students' activity or experimental results create a room for the above purpose. The activity would be planed probing prior knowledge of the students', introduction of new activity for current application- connecting to the daily life and for future application changing learners' mind to the future. The learners should be aware on the learning pattern as follows to improve 'creative learning' on science.

When the learners study science on experiments as above they have to make a conclusion beside the questions and which provides a room to self-understand probing prior knowledge to the future. The teacher has to play a guiding role only making corrections in the learning process. 'Predictions' play a vital role in the science learning process persuading learners' thinking skills and the result is depend on the correct decision in the conclusion. Explanation of concepts behind the experiment results linking to the daily life experience is the most appropriate way to provide knowledge and skills enhancing learners' eagerness for learning science.
Inter-personal interaction is an important role in the teaching-learning cycle creating active and

interesting lesson. Discussion based science lesson help to minimize teacher-learner gap providing active based class room.
The lesson ‘battery chemistry’ was formulated as above and lesson plan was designed providing a room for learners to learn on Inquiry Science learning cycle.

Importance of teaching strategies and skills

The outcome of the teaching process depends on the application of proper teaching strategies and skills. Two teachers can act on a same lesson plan in different ways according to the different teaching strategies and skills. Therefore teacher is the main key in the success of the teaching process. First of all teacher should be well knowledgeable and skillful in the field. Teacher has to plan the lesson properly considering the outcomes of the entire process involving engagement, elaboration, evaluation and application.

Methodology

The lesson ‘battery chemistry’ was planned focusing the improvement of technological skills and knowledge for students’ evolvement in daily life and applied in some selected Sri Lankan high schools (Anula College in Colombo on 5th Jan. 2006, Devi Balika Vidyalaya in Colombo on 6th Jan. 2006 and Darmaraja College in Kandy on 9th Jan.2006). Fruits such as oranges, banana, lemon, tomato, copper and aluminum coins and wires, music detector or bulbs were used in this activity as readily available materials for an active based class room overcoming lack of resources.
The lesson was pre-practiced before the class room applying ‘pre-lesson study’ and ‘teacher evaluation’ processes. This helps to improve the teaching skills and entire teaching process overcoming weaknesses on suggestions.
Simplification of subject matters as much as possible, arrangement of incompact subject matters for one period, color posters for better explanations, demonstrations were used by the teacher to create a relax and active class room. Discussion based teaching process and teacher’s flexibility was very important to make a good inter-personal interaction for an active class room.

The contents of battery chemistry are,

> 1. *Fruit cell*
> 2. *Coin cell*
> 3. *Simple cells (Volta cell, Daniel cell)*
> 4. *Oxidation and reduction reactions around electrodes.*

The lesson was started asking simulation questions- ‘what is a battery’. Different answers were

obtained and errors were corrected defining a battery. Different materials (fruits, vegetables and coins etc.) were shown by the teacher asking 'Can we make batteries using these materials? Students were surprised and answered 'no'. Consequently, battery technology was not exposed in the Sri Lankan science syllabi on the readily available resources and materials. It proved the lack of knowledge on simple batteries. Fruits, coins, wires, bulbs and music detectors were provided as materials and experiment guides and students work sheets were provided as supporting materials. Students surprised and enjoyed by making fruit cells. The theory and concepts were explained according to the students' experimental results. Notes were not provided by the teacher and own notes were prepared by the students while recording experiments on 'inquiry science learning' and answering questions in students' work sheets.

Assessment and evaluation

The students' performance in the assessments indicates the quality, success and achievements of the entire process. Assessment methodology can be used to improve different skills among the students overcoming the problems arises by the exam oriented educational patterns. In this case students were assessed in each experiment for their active participation, recording, reporting results and presentation of the results in English. Students' evaluation in assessment play a vital role changing learners' mind correlatively to enhance learning eager or not. Intellectual application of teaching skills acts to analyze the student performance and weakness cultivating positive attitudes on learning process. Students' talents and performance should be highlighted to encourage them enhancing learning eager though suggestions should be provided smoothly to overcome the weaknesses in the assessment minimizing negative attitudes on learning process. Application of suitable, appropriate teaching skills in an evaluation process cognitively persuade learners' eager for learning.
Well performed Students were evaluated highlighting their talents and skills and the others were encouraged giving suggestions to overcome the weaknesses.
Progress of the teaching process was obtained using the students' performance for a questioner on the results of pre and post test as follows.

Figure2- Students' performance for pre-test. Figure3-Students' performance for post-test.

A pre-test result reveals the lack of knowledge on 'Battery chemistry' among the students. Eighty eight percent of the students obtained less than 40% marks in the pre-test. Students performed well obtaining over 60% marks by seventy eight percent students.
Students' performance for post test reveals the success of the entire process to improve technological skills using readily available materials in developing countries.

The progress of the teaching process was obtained from students' impression on the lesson as follows.

Underline the most suitable answer on your experience.

1. Did you know the importance of ‘Water’ in batteries before this?
a. Yes b. No
2. Did you know ‘how to make batteries using fruits and coins’ before this?
a. Yes b. No
3. Did you know the chemistry of water before this?
a. Yes b. No
4. Did you know the importance of water in the nature before this?
a. Yes b. No
5. Can you make ‘fruit cells’ and ‘coin cells’ at home?
a. Yes b. No
6. What is your impression on ‘Battery Chemistry’?
a. Learnt the technology of battery on Fruits and Coins, applicable at home and enjoyed well.
b. Never learnt the technology of battery and not enjoyed at all.

Figure 4- Students’ impression on the lesson.

Discussion

According to the students’ impression on question no. two shows the understanding of new scientific knowledge from the lesson and their impression on question no. five and six shows the enhancement of future application of technological knowledge using readily available resources. The lesson persuaded learning eagerness among the students and it is an important key point of a good quality lesson.

Highly compact theories and concepts appear in most of the developing countries considering quantitative science education rather than qualitative science education. High percentage of the students in a class room will get understand the subject matters properly by reducing the amount of theories in each level and by applying more learner centered activities and experiments. The complex lessons should be simplified creating interactive and a successful path in science education. Hence, the science curricula should be reformed to apply activities using locally available resources and materials, which persuade learners’ strength for future application such as ‘battery chemistry’.

When the quality of the science education in developing countries are considered proper pre-service and in-service teacher training programs are required to improve proper teaching skills and strategies. Especially teachers should be trained to design a proper teaching plan simplifying complex subject matters as much as possible. Teacher should be a knowledgeable and skillful person on the subject. Teacher should be able to create an accurate interpretation on the contents. The lesson should be planed to support personal understandings, improve skills and

knowledge and make perceptive and well developed connection among concepts and daily life. Activity and experimental based lesson plan designs and conveys information accurately for learner attraction using readily available resources and materials in the country. The lesson is very simple though perspective towards a successful path of better evolvement. Well commitment and scarification of the educator to the duty proceeds to the success and progress of the teaching process for a qualitative science education for developing countries rather than current-quantitative science education causing individual strength for better evolvement.

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